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Stiffness and Resolution Test of the APS T8-31 Vertical Nanopositioning Weak-link Stage

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Precision ball-bearing- or roller-bearing-based positioning stage systems provide large travel range. However, it is not possible to meet sub-nanometer positioning resolution, high tilting stiffness, and sub-microradian straightness of trajectory repeatability with a single guiding system. It has always been a dream to have a compact single flexure stage to cover a large travel range with very high positioning resolution. Based on an advanced structure design using the laminar overconstrained weak-link technique, we have designed and constructed a 2D linear precision weak-link stage system for nanopositioning of a specimen holder for a nanofocusing system based on multilayer Laue lenses at APS sector 26 [1, 2]. This system provides sub-nanometer resolution coupled with sub-nanometer metrology at a travel range of several millimeters.

In this poster we present the preliminary stiffness and positioning resolution test results of the APS T8-31 vertical linear precision weak-link stage.

1. D. Shu and J. Maser, U.S. Patent application in progress for ANL-IN-09-024.
2. D. Shu, H. Yan, and J. Maser, to be published in the *Proceedings of SRI-2008, Nucl. Instrum. and Methods A*.

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